

Biology 3: Infection and Response

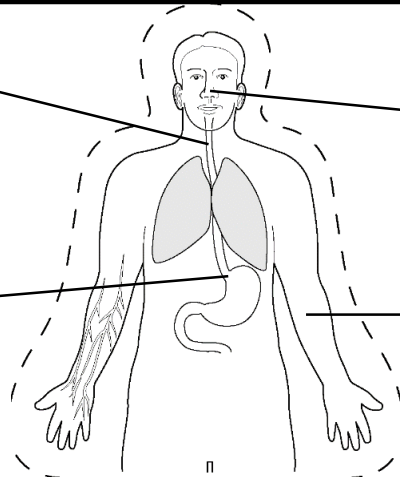
Section 1: Pathogens and Diseases

Disease	Pathogen	How it is spread	Effect	Prevention/ Control
1 Measles	Virus	Droplets from sneezes and coughs	Can be fatal	Vaccination of children
2 HIV	Virus	Sexual contact, needle exchange	Damages some white blood cells	Antiretroviral drugs when infected
3 Tobacco Mosaic Virus	Virus	Direct contact	Mottling of leaves, reduces photosynthesis	
4 Salmonella	Bacteria	Infected food	Fever, abdominal cramps, diarrhoea, vomiting	Vaccination of poultry (chickens).
5 Gonorrhoea	Bacteria	Sexual contact	Discharge from penis/ vagina, pain when urinating	Controlled by antibiotics . Spread prevented by condoms .
6 Rose Black Spot	Fungus	Spores carried by water or wind	Leaves turn yellow, fall early. Photosynthesis reduced.	Treated by fungicides or destroying affected leaves.
7 Malaria	Protist	By a vector – mosquito	Fever, can be fatal.	Preventing mosquitos from breeding , using mosquito nets.

Section 2: Non-Specific Defences

8 Trachea and Bronchi
Produces **mucus** to **trap pathogens**.
Contains **cilia** to **move mucus** for swallowing

10 Stomach
Contains **hydrochloric acid** to destroy pathogens.



9 Nose
Contains **hairs** and **mucus** to **trap pathogens**

11 Skin
A **physical barrier** to pathogens.

Section 3: Key terms

12 Pathogen	A microorganism that causes disease .
13 Bacteria	A type of pathogen that produces toxins that damage tissues .
14 Viruses	A type of pathogen that lives and replicates within cells and causes cell damage . It is difficult to kill viruses without damaging cells .
15 Antibodies	Some white blood cells (lymphocytes) produce antibodies. These bind to pathogens and destroy them or stick them together .
16 Antitoxins	Some white blood cells (lymphocytes) produce antitoxins. Antitoxins neutralise toxins .
17 Antibiotics	Antibiotics kill bacteria . Specific antibiotics should be used for specific bacteria . Some bacteria are resistant to antibiotics. Do not kill viruses .
18 Painkillers	Painkillers relieve symptoms but don't kill pathogens .
19 Phagocytosis	Some white blood cells (phagocytes) engulf pathogens .

Section 4: Drugs

22 Aspirin	Originates from the willow tree.
23 Digitalis	A heart drug . Originates from foxglove plants.
24 Penicillin	Discovered by Alexander Fleming from the <i>Penicillium</i> fungus .
25 New drugs	Most new drugs are synthesised by chemists in the pharmaceutical industry . The starting point may be a chemical extracted from a plant .

20 Natural Immunity

Pathogen enters body

The correct white blood cell is found

Antibodies are produced

The white blood cells remain as memory cells

If the pathogen returns, antibodies will be produced quickly

21 Vaccination

Dead or weakened pathogen is injected

The correct white blood cell is found

Antibodies are produced

The white blood cells remain as memory cells

If the pathogen returns, antibodies will be produced quickly

Section 5: Clinical Trials

Trial Stage	Purpose
26 1. Preclinical – cells, animals	Test for toxicity and efficacy before testing humans
27 2. Healthy volunteers	Very low doses to test for toxicity .
28 3. Patients	Larger groups. Test for toxicity, efficacy and dose . Placebos may be used in a double-blind trial .

Clinical Trial Key Terms

29	Placebo	A drug with no active ingredients , designed to mimic a real drug . Used to test if the effects of a drug on a patient are just psychological .
30	Double-blind trial	The volunteers do not know which group they are in, and neither do the researchers, until the end of the trial
31	Toxicity	How harmful the drug is. May have dangerous side effects .
32	Efficacy	How effective the drug is.
33	Dose	The amount of the drug given to the patient.